CHEMICAL & ENGINEERING NEWS

C&EN

APRIL 27, 1992

MORE SCIENTIFIC HIGHLIGHTS FROM ACS MEETING IN SAN FRANCISCO

GLOBAL WARMING

Multiple interconnections and feedbacks challenge experts Page 7

CHEMICAL & ENGINEERING NEWS

C&EN

APRIL 27, 1992

NEWS OF THE WEEK

- Long-awaited report on misconduct in science urges augmenting traditional safeguards to ensure research integrity. Page 4
- Du Pont and ICI agree to a swap—ICI will acquire Du Pont's U.S.-based acrylic operations, and Du Pont will take over ICI's European nylon business. Page 5
- FDA decides to limit access to silicone gel breast implants while safety studies are conducted, possibly sounding the death knell for such implants. Page 5
- NASA marks Hubble Space Telescope's second anniversary in orbit by releasing latest dramatic photos. Page 6
- Many chemical companies report better first-quarter earnings for 1992 than for first-quarter 1991, but two firms show large declines. Page 6

COVER: Freestanding glass mosaic monument, titled "Second Genesis," symbolizes man's impact on the fragility of Earth. The mosaic was created by Jerry W. Carter for the city of Ravenna, Italy

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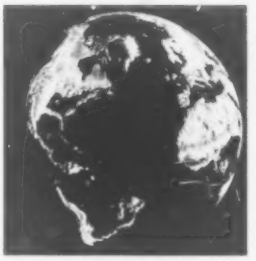

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LETTERS

Effects of organohalogens

It is very encouraging to see the article on the effects of organohalogens on marine animals (C&EN, March 9, page 23) in relation to harm to immune systems suspected by Theo Colborn and other workers. But let us review some figures and facts about halogens and organohalogens.

Planet Earth is estimated to host 1000 billion tons of chloride in rock and 36,000 billion tons in seawater [Hopp, V., *Chem. Ztg.*, **115**, 34 (1991)]. Volcanoes expel 0.4 million to 3 million tons of hydrogen chloride per year; other workers mention 0.4 million to 11 million tons of HCl and HF [*Nature*, **334**, 415 (1988)], and it is highly likely that a fraction of this latter enormous figure is molecular halogen. Bromine can be detected from photochemical oxidation of bromide [*Nature*, **355**, 150 (1992)] and so, probably, can chlorine. And to cite V. Hopp again, "Fungi are known to release 5 million tons of chloro-organic compounds to the environment every year." For comparison, industrial production of molecular chlorine is about 35 million tons for the nondegradable polyvinyl chloride, solvents, and the like, and a fraction of 0.0074 ton for chlorofluorocarbons.

Before we jump to spectacular conclusions about organohalogens causing immune deficiency, it is worthwhile noting these numbers and looking at them from the perspective of a geological time scale. Release of funds to researchers such as Colborn and other prominent (Dutch) workers [*Science*, **255**, 798 (1992)] "to rejuvenate the bad reputations of organohalogens," provides an excellent opportunity to investigate the natural sources and cycles of chloride/chlorine/organohalogens as well.

Albert Alberts
Eindhoven, the Netherlands

High tech in Taiwan

Joseph Haggin's two articles on Taiwan's science & technology (C&EN, Feb. 3, page 21; Feb. 10, page 17) are well written and informative. However, he omitted mention of the newly established Pharmaceutical Research & Development Laboratories at the Development Center for Biotechnology (DCB-PR&D) in Taipei.

DCB-PR&D is a government-sponsored nonprofit organization with the sole objective of discovering and developing new medical entities for Taiwan's indigenous pharmaceutical companies to manufacture and sell in the global market. It epitomizes the government's determined efforts to promote high-tech and high-return industries such as pharmaceuticals.

Albert Y. Chang
Managing Director
Pharamaceutical R&D Laboratories, DCB
Taipei, Taiwan

Worldwatch Institute

The secular humanist, socialist article on Worldwatch Institute (C&EN, Jan. 20, page 18) ought to be recognized for the trash it is. A clean environment is fine, but restructuring the religious, national, and social order to get there is not.

There are a lot more important things in life that were recognized by our founding fathers—for example, "one nation under God"—that ought to come before all this environmental poppycock. In other words, the spiritual part of humans is of much more importance than the physical part.

I suggest that the squeaky clean, scraped womb society be sold an island where they can practice socialized, communal living free of phosphates, chlorofluorocarbons, incinerators, plastics, and so on to their hearts' content. And they can legislate that none of the God-worshipping kooks like myself can enter without clearance from the United Nations.

Joseph J. Guido
Hinsdale, Ill.

This is in regard to your article on Worldwatch Institute and Michael Renner's comments that the oil refining and chemical industries in the U.S. are "capital intensive, notorious users of energy, prodigious producers of pollution, and stingy users of human labor."

Tell Renner that my company—primarily engaged in oil refining and chemicals—provides almost 33,000 good-paying American jobs. Ask him how many he and his buddies provide.

Fred Brothers
Ashland Oil
Columbus, Ohio

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Chemical Industry Near Top In U.S. Trade Performance

■ ***Industry has long and consistent record of trade surpluses; among reasons are competitiveness, globalization, weak dollar***

Earl V. Anderson,
C&EN Northeast News Bureau

Like Rodney Dangerfield, the chemical industry "don't get no respect" when it comes to international trade, says Richard M. Patterson, government relations manager for Dow Chemical. Many others in the industry share his opinion, if not his simile.

It seems that whenever stories about the country's trade performance appear in the business press, the spotlight is on the persistent overall trade deficit and the poor, but improving, performance of manufactured goods in general. Last year's trade deficit in autos alone was a whopping $34.7 billion.

Plaudits, if any, go to agricultural commodities and to aircraft and aircraft parts. Based on their trade performance, agriculture and aircraft certainly deserve the praise.

But so, too, does the chemical industry. Whereas the U.S. has suffered a cumulative trade deficit of more than a trillion dollars over the past 10 years (1981–91), the chemical industry alone has chalked up a cumulative trade surplus, or net of exports over imports, of more than $126 billion. In those 10 years, it has never had a trade deficit.

Last year the chemical industry exported almost $43 billion worth of chemicals and imported $24.2 billion worth. That performance garnered it a record trade surplus of $18.8 billion, the third successive year of new highs for its trade surplus.

That chemical trade surplus is greater than the $16.3 billion surplus in agricultural commodities. And, although it can't match the $27 billion trade surplus that aircraft manufacturers achieved, the $43 billion in chemical exports handily tops the $34.7 billion worth of aircraft and parts that were exported last year.

In 1981, chemicals accounted for 9.1% of all U.S. exports. Last year, its share hit 10.2%.

All of these numbers unquestionably qualify the chemical industry for superstar status in the international trade game.

But more important than why the industry "don't get no respect" for its status is why the industry is faring so well in international trade in the first place. There is no single reason, but a combination of circumstances that has made the U.S. chemical industry one of the most competitive in the world.

A huge domestic market has made it possible for the industry, especially the petrochemical sector, to build large plants with their innate economy of scale. The flexibility of basic olefins units to use light—and less expensive—feedstocks gives olefins producers and their downstream petrochemicals customers an edge.

The industry produces more than 60,000 different products, ranging from the commodity organics and inorganics to highly specialized products. Some compete on price. For others, there simply is no reasonable substitute.

The chemical industry is a truly "global" industry, which in itself stimulates trade. "Chemicals [are] probably more globalized than any other major manufacturing industry," says Allen J. Lenz, director for trade and economics for the Chemical Manufacturers Association (CMA).

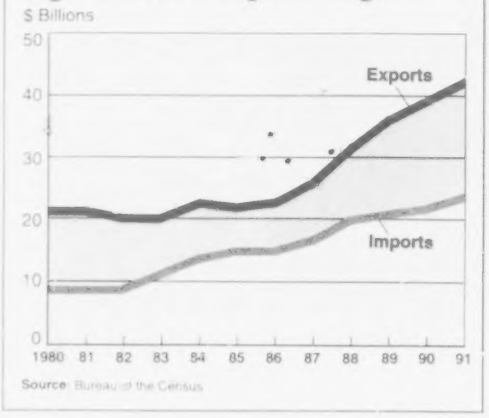
There are many other factors that affect the way the trade ball bounces—factors that are beyond the control of the chemical industry itself. Currency exchange rates are one of them. Major political upheavals—the Persian Gulf War is just one of many examples—are another.

In recent testimony on trade policy before the House Ways & Means Subcommittee on Trade, W. H. Clark Jr., head of the Office of the Chemical Industry Trade Adviser and chairman and chief executive officer of Nalco Chemical, pinpointed the role that even a country's trade laws can play. He said that, for the most part, U.S. trade laws have been eminently fair to the U.S. chemical industry, and that "we've flourished in this hospitable climate."

Most of this "flourishing" has been done by the large, U.S.-based multinational chemical companies, which traditionally have been the dominant chemical exporters. They still are, but there are signs that small and medium-sized chemical companies now are getting into the export act.

Vincent J. Kamenicky, senior chemical adviser in the Commerce Department's International Trade Administration, says that,

Chemical trade balance hits new high in 1991 as exports surge



U.S. chemical industry had record trade surplus of $18.8 billion in 1991

$ Millions	1989	1990	1991	% change 1990–91
Canada				
Exports	$4,210	$ 6,050	$ 6,555	8.3%
Imports	3,934	4,305	4,352	1.1
Trade balance	276	1,745	2,203	
European Community				
Exports	9,758	10,509	11,250	7.1
Imports	9,158	9,728	10,418	7.1
Trade balance	600	781	832	
Eastern Europe				
Exports	409	460	387	(15.9)
Imports	208	242	263	8.7
Trade balance	201	218	124	
Communist Asia				
Exports	1,136	1,054	1,671	58.5
Imports	273	337	392	16.3
Trade balance	863	717	1,279	
Japan				
Exports	4,664	4,382	5,047	10.1
Imports	2,373	2,391	2,706	13.2
Trade balance	2,291	2,191	2,341	
Rest of Asia				
Exports	6,624	6,566	7,172	9.2
Imports	985	1,267	1,445	14.0
Trade balance	5,639	5,299	5,727	
Middle East				
Exports	$ 543	$ 629	$ 673	7.0%
Imports	371	355	372	4.8
Trade balance	172	274	301	
Latin America				
Exports	5,419	5,773	6,590	14.2
Imports	1,671	1,287	1,333	3.6
Trade balance	3,748	4,486	5,257	
Australasia				
Exports	1,364	1,247	1,357	8.8
Imports	291	344	421	22.4
Trade balance	1,073	903	936	
Africa				
Exports	702	628	715	13.9
Imports	61	90	95	5.6
Trade balance	641	538	620	
Other				
Exports	1,656	1,485	1,550	4.4
Imports	1,427	2,122	2,372	11.8
Trade balance	229	(637)	822	
TOTAL				
Exports	$36,485	$38,983	$42,967	10.2%
Imports	20,752	22,468	24,169	7.6
Trade balance	15,733	16,515	18,798	

Source: Bureau of the Census

since the mid-eighties, many small and midsize chemical companies have tested and liked the export market. These companies typically have specialty products for niche markets. "There should be tremendous export growth in these areas," says Kamenicky.

"Globalization" of the chemical industry has had a definite, if not a completely apparent, impact on U.S. chemical exports. U.S. chemical companies have invested heavily in the chemical industries of other countries. And foreign chemical companies have invested large amounts of money in the U.S. chemical industry, particularly in the past few years.

In 1988, according to the Department of Commerce, 170 U.S. chemical industry "parents" had 2867 affiliates abroad in all industries, including chemicals. Conversely, there were 1749 affiliates of foreign chemical companies in the U.S.

These complementary foreign direct investments have generated substantial trade between U.S. chemical companies and their foreign affiliates, and between U.S. affiliates and their foreign parents, says CMA's Lenz. The Commerce Department estimates that, in 1988, U.S. chemical company parents exported $10.6 billion to their foreign affiliates.

That's a hefty one third of all the chemicals ($31.9 billion) exported that year. Add to that the $4 billion that U.S. affiliates exported to their foreign parents and this two-way direct investment, this globalization of the chemical industry, as Lenz calls it, can be credited with almost half of what the U.S. chemical industry exports.

More than two thirds of the U.S. chemical industry's direct foreign investment is in Europe and Canada. And about 94% of the foreign direct investment in the U.S. chemical industry is by companies based in either Europe or Canada.

Consequently, most of the parent-affiliate trade in chemicals occurs between the U.S. and those two areas. And a very high proportion of U.S. chemical trade with those two areas is between parents and affiliates.

Exchange rates, and thus the strength or weakness of the U.S. dollar against major foreign currencies, can have a significant impact on trade performance, including that of the U.S. chemical industry. A strong dollar, for instance, makes U.S. exports more expensive—and less competitive—in foreign markets. Imports, meanwhile, become more competitive. All else being equal, the U.S. chemical trade surplus suffers when the dollar is strong.

Conversely, when the dollar is weak, U.S. exports become more competitive abroad and imports become more expensive in U.S. markets. This helps the chemical trade balance.

In the early eighties, the dollar grew much stronger. It peaked in 1984. During those years, chemical exports grew slowly or declined. Chemical imports grew much more rapidly than exports.

The U.S. chemical trade surplus dropped sharply and did not bottom out until 1985. Of course, the recession of the early eighties also influenced the chemical trade patterns of the times. But there's a strong correlation between exchange rates and chemical trade flows.

Since 1985, the dollar has generally gotten much weaker, although it did regain some of that lost strength during part of last year. Nevertheless, as the dollar weakened, U.S. chemical exports

Four developing nations in top 10 U.S. chemical export markets . . .

Top 10 countries	1991 U.S. chemical exports, $ millions
1 Canada	$6555
2 Japan	5047
3 Mexico	2624
4 Belgium	2367
5 Netherlands	2357
6 Germany	1911
7 Taiwan	1840
8 China	1671
9 South Korea	1658
10 U.K.	1580

. . . but only one is a major supplier of U.S. chemical imports

Top 10 countries	1991 U.S. chemical imports, $ millions
1 Canada	$4348
2 Germany	3228
3 Japan	2739
4 U.K.	2228
5 France	1573
6 Switzerland	1136
7 Italy	865
8 Mexico	700
9 Netherlands	671
10 Ireland	662

Source: Bureau of the Census

grew rapidly, far outpacing the growth in chemical imports. And, since 1986, the U.S. chemical trade surplus has increased every year, expanding two and a half times to $18.8 billion last year.

In fact, the chemical industry has chalked up trade surpluses in each of the nine major product groups by which chemical trade data are measured. By far the largest chemical trade surplus belongs to "plastics in primary form," another way of saying synthetic resins. This category had a lopsided $5.6 billion surplus last year on exports of $7.5 billion.

Other chemical categories that have large trade surpluses include organics, medicinals and pharmaceuticals, fertilizers, and the catch-all "other" category. The industry has even been able to turn around its trade in dyes, tanning, and coloring materials.

This category ran trade deficits from 1984 to 1989, reaching a high of $315 million in 1987. But in 1990, that category racked up a trade surplus of $300 million, before tapering off to $232 million last year.

Another "basket" category of chemical products that includes essential oils, perfumes, and all kinds of toiletry and cleansing preparations also ran slight trade deficits between 1986 and 1988. But these products enjoyed a huge $944 million trade surplus last year.

Not surprisingly, the bulk of U.S. chemical exports goes to other industrialized countries. Canada is the largest single export market for U.S. chemicals. It, along with the 12-nation European Community (EC), accounts for more than 40% of the total.

Although the U.S. ran chemical trade deficits with both Canada and the EC from 1984 to 1988, it has since converted them into substantial trade surpluses.

But developing country markets also are important in the U.S. chemical trade picture. Asia and Latin America, in particular, are large and growing markets for U.S. chemical exports. Last year, those two areas alone took 32% of all U.S. chemical exports. And last year, they were the fastest growing of all the major U.S. chemical export markets.

Lenz and other trade experts think that the chemical trade surplus may have peaked last year. And modest declines may be likely for the next few years as new capacity comes on stream overseas.

But even these developments will not diminish the chemical industry's luster as one of the country's strongest trade performers. □

Exports of several chemical categories registered double-digit increases last year

$ Millions	1989	1990	1991	% change 1990–91
Organics				
Exports	$10,609	$10,400	$10,928	5.1%
Imports	7,042	7,392	8,157	10.3
Trade balance	3,567	3,008	2,771	
Inorganics				
Exports	4,319	3,816	4,102	7.5
Imports	3,231	3,234	3,299	2.0
Trade balance	1,088	582	803	
Dyeing, tanning & coloring materials				
Exports	1,097	1,588	1,648	3.8
Imports	1,133	1,288	1,416	9.9
Trade balance	-36	300	232	
Medicinals & pharmaceuticals				
Exports	3,660	4,103	4,606	12.3
Imports	2,086	2,500	3,053	22.1
Trade balance	1,574	1,603	1,553	
Essential oils, perfumes, toiletry & cleansing preparations				
Exports	1,469	1,963	2,361	20.3
Imports	1,165	1,323	1,417	7.1
Trade balance	304	640	944	

$ Millions	1989	1990	1991	% change 1990–91
Fertilizers				
Exports	$ 2,821	$ 2,574	$ 2,980	15.8%
Imports	999	955	919	-3.8
Trade balance	1,822	1,619	2,061	
Plastics in primary form				
Exports	5,727	6,428	7,537	17.3
Imports	1,687	1,974	1,930	-2.2
Trade balance	4,040	4,454	5,607	
Plastics in nonprimary form				
Exports	2,202	2,633	2,786	5.8
Imports	1,629	1,774	1,855	4.6
Trade balance	573	859	931	
Other				
Exports	4,583	5,478	6,020	9.9
Imports	1,780	2,028	2,123	4.7
Trade balance	2,803	3,450	3,897	
TOTAL				
Exports	$36,485	$38,983	$42,967	10.2%
Imports	20,752	22,468	24,169	7.5
Trade balance	15,733	16,515	18,798	

Source: Bureau of the Census